Appendix C – Plan for Interim Operation

INTRODUCTION

Per WAC 173-240-070, a plan for the interim operations of a domestic wastewater facility is required to be included in the Plans and Specifications for upgrades to such facilities. This appendix is intended to fulfill that requirement.

The Contractor must meet the requirements of Technical Specification Division 1.72 for scheduling and sequencing of construction activities at the Water Reclamation Facility (WRF). This appendix provides the general approach to interim operations of facility components for WRF staff to utilize in relation to the Contractor's work at each location for this project.

HEADWORKS

The headworks influent flow must be temporarily bypassed to allow the Contractor to replace the screen and upgrade the grit removal system. The Plans outline temporary bypass configurations for the main screening channel and grit chamber systems that must remain operational while the proposed improvements are made. Short term manual operations are allowed as outlined in the Technical Specifications for the Contractor to set-up and remove temporary systems. WRF staff will operate all equipment, devices and valving necessary to start-up and shut-down equipment.

Key Interim Operational Considerations:

1. The WRF staff operate all necessary equipment to bypass influent flow around the main screening channel. The bypass channel has a manual bar screen that the Contractor will rake and clean during operation. The main screening channel may be temporarily offline as allowed by the Technical Specifications.
2. The WRF staff operate all necessary equipment to bypass flow around the grit system. A short-term temporary shutdown of the grit chamber is allowed as outlined in the Technical Specifications. A short-term temporary shutdown of the grit system may allow some grit to pass into the oxidation ditches. This will not affect plant operations or effluent quality and grit will be removed by WRF staff during the normal annual cleaning and switching of online oxidation ditches.

OXIDATION DITCH CONVERSION TO ACTIVATED SLUDGE BASINS

The conversion and start-up activities for the new activated sludge basins are required to be phased in a manner that maintains the operability of one existing ditch (or one new basin) at all times in order to ensure that secondary treatment is maintained. In general, both clarifiers will also be able to be utilized through the majority of construction and start-up except for brief periods as described below.

WRF staff will operate all necessary valving and equipment as required to switch ditches/basins and in general, will be required to operate existing and new systems to maintain permit compliance.

The Technical Specification Division 1.72 describes the requirements for construction phasing that must be followed by the Contractor to maintain operability of the WRF.

A fundamental criterion for the start-up of the Activated Sludge Basins will be to avoid the co-mingling of the existing activated sludge with the activated sludge formed in the new basins. The start-up phases have been specifically configured for this purpose.

See the attached schematic figures, referenced throughout this section, depicting the activated sludge basin startup configurations.

Interim operational requirements of the secondary treatment system:

Ditch No. 2 Conversion (Figure 1)

1. WRF staff will empty and maintain Oxidation Ditch (Ditch) No. 2 offline prior to the Contractor's work in this ditch.
2. The WRF staff operate all necessary equipment to direct the main influent flow to Ditch No. 1 (southern ditch) while the Contractor performs work on Ditch No. 2 (northern ditch).
3. Activated Sludge Basin No. 2 will initially be full of clean water upon completion of the Contractor's testing and check-out of the interlocking controls.

Basin No. 2 Start-Up (Figure 2)

1. Upon successful conversion of Ditch No. 2, the Contractor will provide the three necessary temporary pumping systems for start-up of Activated Sludge Basin No. 2 as described in Division 1.72 (each with 500 gpm capacity):
    a. Temporary pump and pipe system from the Headworks to the An1 zone to supply influent to the basin.
    b. Temporary pump and pipe system from the Ox2 zone to the An1 zone for the recycle process.
    c. Temporary pump and pipe system from the Mixed Liquor Outfall structure to the manhole north of the basins to recycle flows back to the Headworks.
2. RH2 will provide temporary SCADA system programming to allow the temporary pumps to operate automatically at operator-defined setpoints. Temporary SCADA system programming will also be provided for the Activated Sludge Basin No. 2 equipment through start-up. In general, the aeration, mixing and internal recycle equipment in Ox3 will be cycled to facilitate retention of the activated sludge in this basin through start-up. Minimal sludge wasting will occur from this basin during start-up.
3. Activated Sludge Basin No. 2 will be operated by WRF staff through start-up and into full operation. The operational requirements through start-up of this basin generally consist of the following:
    a. The City will begin feeding approximately 100 gpm (0.14 MGD) of the influent into Activated Sludge Basin No. 2 via the temporary pump provided at the Headworks. Effluent from this basin will be returned to the Headworks for treatment through the online Ditch No. 1 via the temporary pump at the Mixed Liquor Outfall structure from Activated Sludge Basin No. 2. An additional temporary pump will provide an internal recycle stream from

Ox2 to An1, which will return activated sludge to the anaerobic zones during the start-up period, as no clarifier will be dedicated to Activated Sludge Basin No. 2 during start-up. This configuration should allow activated sludge to develop in the new basin without significant concern of degrading effluent quality.

b. During the start-up of Activated Sludge Basin No. 2, the WRF staff will monitor the mixed liquor suspended solids (MLSS) concentration in the new basin and incrementally increase the daily feed volume to the new basin up to 500 gpm (0.72 MGD) as the MLSS concentration increases. Conversely, the WRF staff will monitor Ditch No. 1 MLSS concentration and allow it to be reduced incrementally through wasting as daily influent is reduced to this ditch.

c. The WRF staff will monitor the concentration, settleability and other characteristics of the activated sludge in the new basin as is typical for any activated sludge operation. WRF staff will also monitor the effluent quality from Ox3 by sampling mixed liquor from Ox3, allowing it to settle and analyzing the supernatant for conventional parameters and nutrients. This information will be used to gauge the treatment afforded by the new basin relative to influent flow. Once the MLSS has risen in the new basin to an appropriate level (likely in the range of 3,000 mg/L, though this will be determined by WRF staff) and the activated sludge population has sufficiently formed, this basin will be ready to receive all influent flow and begin discharging to Secondary Clarifier No. 2.

d. The WRF staff will isolate Secondary Clarifier No. 2 and will waste the remaining sludge from this clarifier to the solids handling system in preparation of receiving flow from Activated Sludge Basin No. 2.

Basin No. 2 Commissioning (Figure 3)

1. The WRF staff will isolate Ditch No. 1 and Secondary Clarifier No. 1.
2. The WRF staff will direct all influent flow to Activated Sludge Basin No. 2 and direct mixed liquor from Activated Sludge Basin No. 2 to Secondary Clarifier No. 2. The Contractor will remove all temporary pumping systems from Activated Sludge Basin No. 2. At this time Activated Sludge Basin No. 2 and Secondary Clarifier No. 2 will be considered fully commissioned and under normal operation. The City will verify that effluent from the new system can reliably meet permit requirements prior to sludge removal from Ditch No. 1.

Ditch No. 1 Sludge Removal (Figure 4)

1. The Contractor will reconfigure the two necessary temporary pumping systems for use in the sludge removal from Ditch No. 1 and Secondary Clarifier No. 1 (each with 500 gpm capacity):
    a. Temporary pump and pipe system from the end of Ditch No. 1 to Secondary Clarifier No. 1.
    b. Temporary pump and pipe system from the Secondary Clarifier No. 1 outfall to Ditch No. 1 to recycle effluent.
2. In this configuration, WRF staff will continually waste sludge from Secondary Clarifier No. 1 to the solids handling system. Non-potable water will be added via an existing hydrant to Ditch No. 1 to continually replace the wasted liquid. At a wasting rate of 100 gpm, it is estimated that the City will be able to reduce the Ditch No. 1 sludge concentration to approximately 500 mg/L in 3 days through this configuration. Less than 100,000 gallons of thickened sludge (2-3% solids) will be pumped to the digesters during this period and sufficient digester volume should be made

available in advance of this work. During this period, no wasting will occur from Activated Sludge Basin No. 2 and Secondary Clarifier No. 2.

Ditch No. 1 Draining (Figure 5)

1. The City will suspend mixing and aeration to Ditch No. 1.
2. The Contractor will utilize a temporary pump to transfer the majority of the supernatant from Ditch No. 1 to Secondary Clarifier No. 1.
3. The City will continue to waste from Secondary Clarifier No. 1 as necessary. The supernatant will pass through the clarifier and into the effluent. WRF staff will closely monitor the effluent concentrations and reduce or suspend supernatant pumping by the Contractor if needed.
4. The sludge remaining in Ditch No. 1 will settle once mixing and aeration are suspended. ~~It is expected that less than 100,000 gallons of sludge will remain in the ditch after the supernatant is pumped out. The Contractor will remove and dispose of this remaining sludge.~~ **The Contractor is required to hose and pump settled activated sludge to the clarifier until the anticipated amount of material is remaining as described in Division 1.72 of the Technical Specifications. The Contractor must remove and dispose the remaining grit, sludge, and other materials unable to be pumped to the clarifier. The Contractor shall submit documentation describing their removal approach and disposal location and will coordinate with the City on any procedures to ensure Washington State Department of Ecology's process requirements are met.** The Contractor and WRF staff will coordinate to ensure sludge is not drained to the in-plant pump station.[1]

Ditch No. 1 Conversion (Figure 6)

1. The Contractor will convert Ditch No. 1 to Activated Sludge Basin No. 1 as described in Division 1.72 of the Technical Specifications.
2. Activated Sludge Basin No. 1 will initially be full of clean water upon completion of the Contractor's testing and check-out of the interlocking controls.
3. Activated Sludge Basin No. 1 will remain offline until WRF staff are ready to switch the online basins.

SOLIDS HANDLING FACILITY AND AEROBIC DIGESTERS

Work to install the improvements in the digesters must not be performed during conversion of the ditches or during basin start-up as described in Division 1.72 of the Technical Specifications. WRF staff will isolate each digester in order for the improvements to be completed sequentially.

1. WRF staff will isolate Digester No. 1 while keeping Digesters Nos. 2 and 3 online during the construction improvements in Digester No. 1.
2. WRF staff will isolate Digester No. 2 while keeping Digesters Nos. 1 and 3 online during the construction improvements in Digester No. 2.
3. The Contractor provides a temporary pump and pipe system for digester clean water testing as described in Division 1.72 of the Technical Specifications.
4. It is anticipated that the biosolids will continue to meet the Class B requirements during this work. However, if vector attraction reduction requirements cannot be met due to reduced solids retention time during this work, the City can pay an additional tipping fee for immediate incorporation of the biosolids at the land application site.

[1] Addendum No. 1 dated May 8, 2023

DITCH NO. 2 OFFLINE FOR:
- CONVERSION TO ACTIVATED SLUDGE BASIN NO. 2
- CLEANWATER TESTING

HEADWORKS

SECONDARY CLARIFIER NO. 2

ONLINE

INF

An2

An3

Ax1

An1

Ax2

PROPOSED MIXER

INSTALL ADJUSTABLE FIXED BLADE WEIR ALONG ENTIRE LENGTH OF PROPOSED CONCRETE WALL. SEE DWG NO. G004 FOR WEIR ELEVATION AND SEE DWG NO.M318 FOR DETAIL.

Ox1

Sw1

TO ML OUTFALL

Ox3B

Ox3A

ACTIVATED SLUDGE BASIN NO. 2

99'-4"

58'-0"

APPROX. LOCATION OF CONDENSATE PIPE TAP ON THE UNDERSIDE OF AERATION PIPE

Ox2

60'-10"

4'-4"

RAS

OXIDATION DITCH NO. 1

ONLINE

INFLUENT+ RAS

ONLINE

SECONDARY CLARIFIER NO. 1

MIXED LIQUOR TO CLARIFIERS

GRATED PLATFORM

GRATED PLATFORM

PROPOSED BLOWER BUILDING

VACTOR DECANT STATION

FIGURE 1

DITCH NO. 2 CONVERSION

RH2

CITY OF SNOQUALMIE

SCALE:NTS

0" 1/2" 1"

DRAWING IS FULL SCALE WHEN BAR MEASURES 1"

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FIGURE 2

BASIN NO. 2 START-UP

HEADWORKS

TEMP PUMP

SECONDARY CLARIFIER NO. 2

ONLINE

PORTION OF INF. TO AN1

INF

BASIN EFFLUENT

TEMP PUMP

GRAVITY TO CLARIFIERS

An2

An3

Ax1

An1

Ax2

Ox1

Ox3B

Ox3A

ACTIVATED SLUDGE BASIN NO. 2

PROPOSED MIXER

Sw1

RECYCLE

Ox2

TEMP PUMP

RAS

OXIDATION DITCH NO. 1

ONLINE

INFLUENT+ RAS

ONLINE

SECONDARY CLARIFIER NO. 1

MIXED LIQUOR TO CLARIFIERS

GRATED PLATFORM

PROPOSED BLOWER BUILDING

VACTOR DECANT STATION

RH2

CITY OF SNOQUALMIE

SCALE: NTS

0" 1/2" 1"

DRAWING IS FULL SCALE WHEN BAR MEASURES 1"

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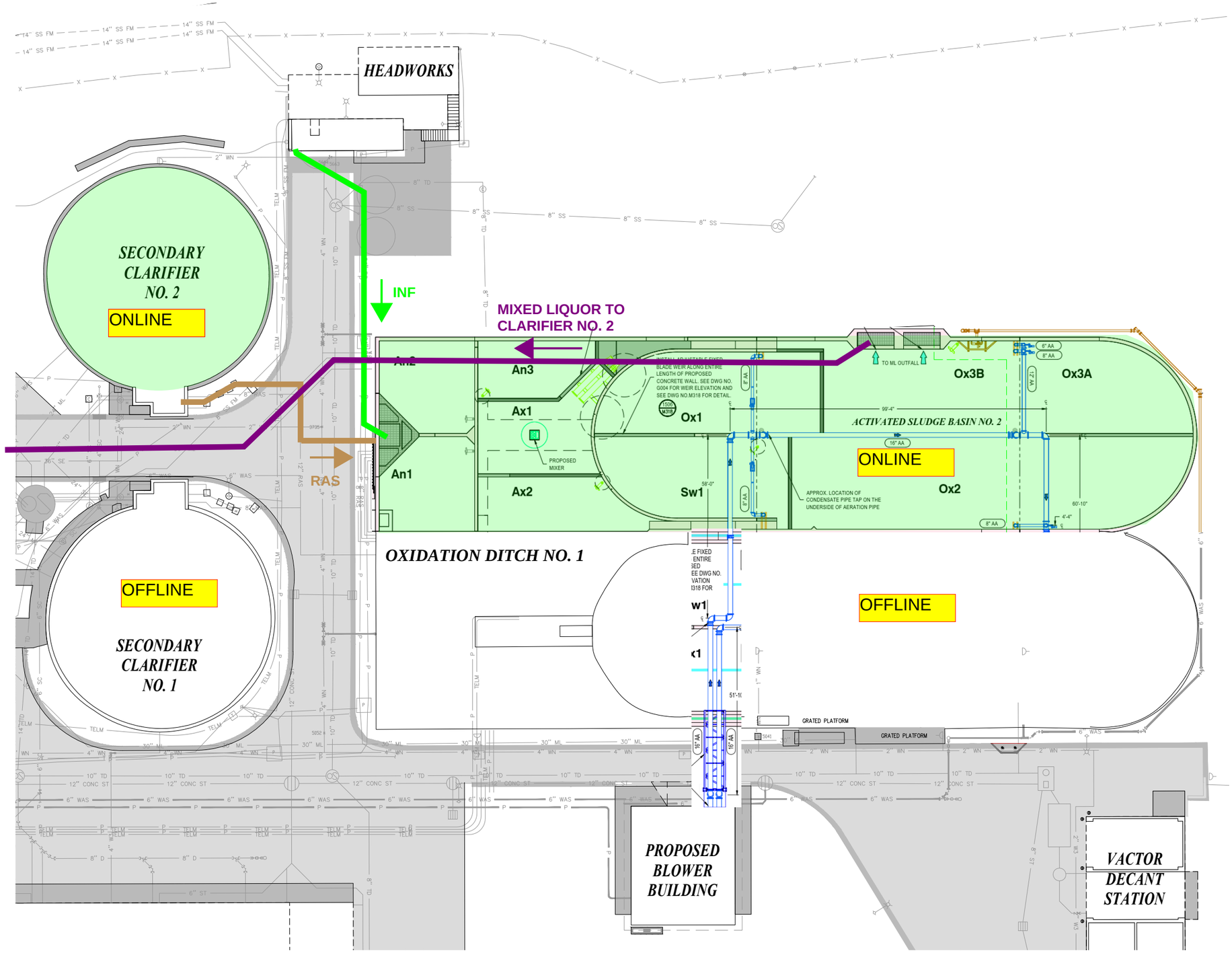

FIGURE 3

BASIN NO. 2 COMMISSIONING

RH2

CITY OF SNOQUALMIE

SCALE: NTS

0" 1/2" 1"

DRAWING IS FULL SCALE WHEN BAR MEASURES 1"

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HEADWORKS

SECONDARY CLARIFIER NO. 2

ONLINE

INF

MIXED LIQUOR TO CLARIFIER NO. 2

An2

An3

Ax1

An1

Ax2

PROPOSED MIXER

INSTALL ADJUSTABLE FIXED BLADE WEIR ALONG ENTIRE LENGTH OF PROPOSED CONCRETE WALL. SEE DWG NO. G004 FOR WEIR ELEVATION AND SEE DWG NO.M318 FOR DETAIL.

Ox1

Sw1

TO ML OUTFALL

Ox3B

Ox3A

ACTIVATED SLUDGE BASIN NO. 2

ONLINE

Ox2

APPROX. LOCATION OF CONDENSATE PIPE TAP ON THE UNDERSIDE OF AERATION PIPE

RAS

TEMP PUMP IN OUTFALL

WAS

SECONDARY CLARIFIER NO. 1

OFFLINE:
- WASTE SLUDGE TO THICKENER AND DIGESTERS

OXIDATION DITCH NO. 1

EFFLUENT RETURN

MIXED LIQUOR

w1

x1

GRATED PLATFORM

OFFLINE:
- RECYCLE DITCH CONTENTS THROUGH CLARIFIER
- WASTE SOLELY FROM DITCH NO. 1 AND CLARIFIER NO. 1

TEMPORARY PUMP

NON POTABLE WATER ADDITION TO REPLACE WASTING

PROPOSED BLOWER BUILDING

VACTOR DECANT STATION

FIGURE 4

DITCH NO. 1 SLUDGE REMOVAL

RH2

CITY OF SNOQUALMIE

SCALE: NTS

0" 1/2" 1"

DRAWING IS FULL SCALE WHEN BAR MEASURES 1"

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HEADWORKS

SECONDARY CLARIFIER NO. 2

ONLINE

INF

MIXED LIQUOR TO CLARIFIER NO. 2

RAS

An3

Ax1

An1

Ax2

Ox1

Sw1

Ox3B

Ox3A

ACTIVATED SLUDGE BASIN NO. 2

ONLINE

Ox2

OXIDATION DITCH NO. 1

w1

x1

OFFLINE

SECONDARY CLARIFIER NO. 1

TEMP PUMP

SUPERNATANT

OFFLINE:
- WASTE ANY RESIDUAL SLUDGE TO THICKENER AND DIGESTERS

PROPOSED BLOWER BUILDING

VACTOR DECANT STATION

GRATED PLATFORM

FIGURE 5

DITCH NO. 1 DRAINING

RH2

CITY OF SNOQUALMIE

SCALE: NTS

0" 1/2" 1"

DRAWING IS FULL SCALE WHEN BAR MEASURES 1"

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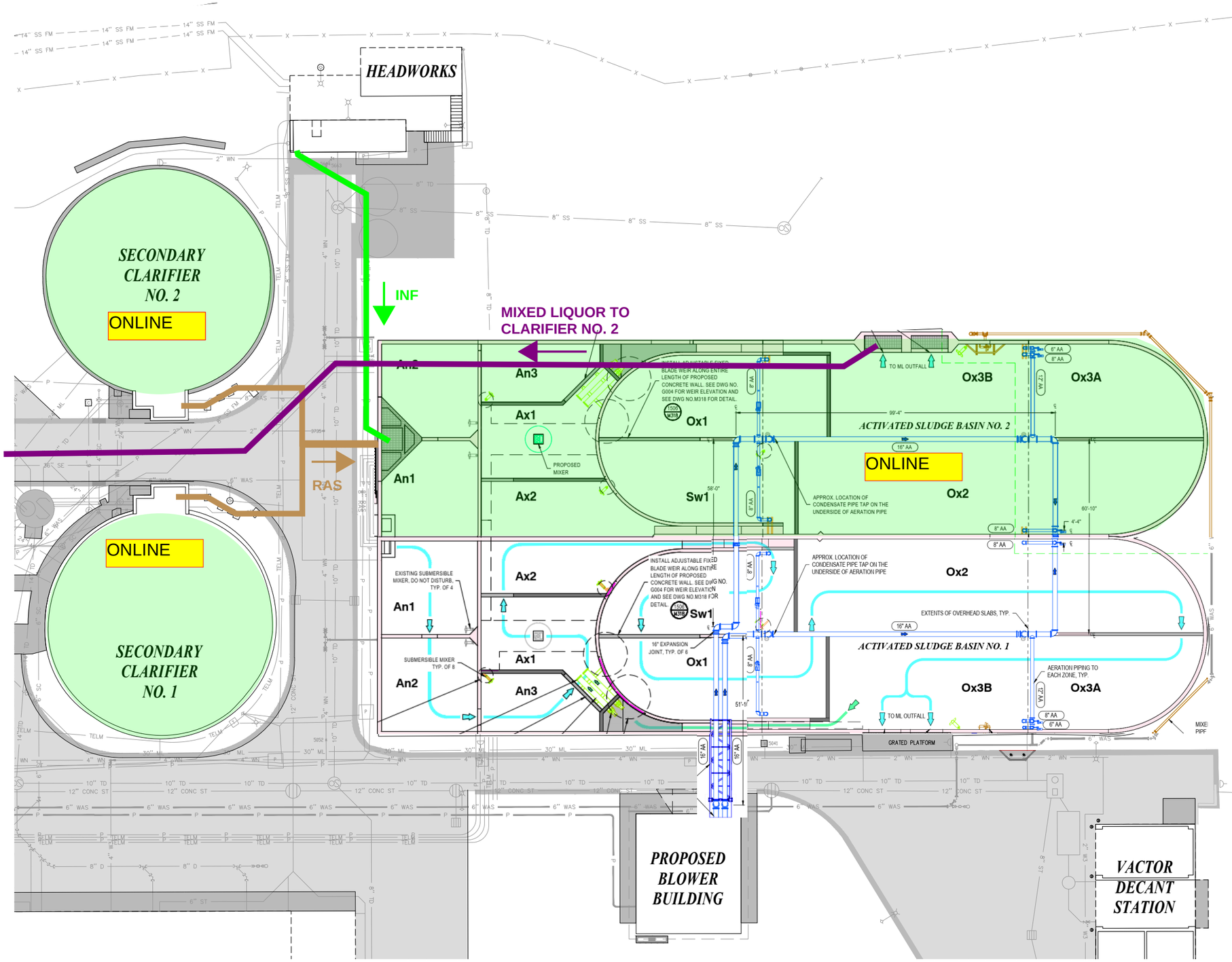

OFFLINE:
- COMPLETE CONVERSION TO ACTIVATED SLUDGE BASIN NO. 1
- CLEANWATER TEST

FIGURE 6

DITCH NO. 1 CONVERSION

SCALE: NTS

0" 1/2" 1"

DRAWING IS FULL SCALE WHEN BAR MEASURES 1"

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